

1 1. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves with a first width
5 and a first pitch;
6 a second polishing region surrounding the first
7 polishing region and having a second plurality of
8 substantially circular concentric grooves with a second
9 width and a second pitch; and
10 wherein at least one of the second width and second
11 pitch differs from the first width and first pitch.

1 2. The polishing pad of claim 1, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a third plurality of
4 substantially circular concentric grooves with a third width
5 and a third pitch.

1 3. The polishing pad of claim 2, wherein the third
2 width and pitch are equal to the first width and pitch,
3 respectively.

1 4. The polishing pad of claim 3, wherein the first
2 pitch is larger than the second pitch.

1 5. The polishing pad of claim 4, wherein the first
2 pitch is about two times larger than the second pitch.

1 6. The polishing pad of claim 3, wherein the first
2 width is less than the second width.

1 7. The polishing pad of claim 6, wherein the
2 second width is about six time greater than the first width.

1 8. The polishing pad of claim 1, wherein each
2 groove of the first and second pluralities of grooves has a
3 depth of at least about 0.02 inches, a width of at least
4 about 0.015 inches, and a pitch of at least about 0.09
5 inches.

1 9. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 depth between about 0.02 and 0.05 inches.

1 10. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 width between about 0.015 and 0.04 inches.

1 11. The polishing pad of claim 8, wherein each
2 groove of the first and second pluralities of grooves has a
3 pitch between about 0.09 and 0.24 inches.

1 12. The polishing pad of claim 1, wherein the first
2 plurality of grooves are separated by a first plurality of
3 annular partitions and the second plurality of grooves are
4 separated by a second plurality of annular partitions.

1 13. The polishing pad of claim 12, wherein the
2 first plurality of partitions cover about 75% of the surface
3 area of the first region and the second plurality of
4 partitions cover about 50% of the surface area of the second
5 region.

1 14. The polishing pad of claim 12, wherein the
2 partitions of the first plurality of partitions are wider
3 than the partitions of the second plurality of partitions.

1 15. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing system, comprising:
3 a polishing surface having a first polishing region
4 and a second polishing region surrounding the first
5 polishing region, a spiral groove formed in the polishing
6 surface, the spiral groove having a first pitch in the first
7 polishing region and a second, different pitch in the second
8 polishing region.

1 16. The polishing pad of claim 15, wherein the
2 first pitch is larger than the second pitch.

1 17. The polishing pad of claim 15, wherein the
2 spiral groove has a uniform width.

1 18. The polishing pad of claim 15, further
2 comprising a third polishing region surrounding the second
3 polishing region, and the pitch of the spiral groove in the
4 third polishing region is equal to the first pitch.

1 19. The polishing pad of claim 15 wherein the
2 spiral groove has a depth of at least about 0.02 inches, a
3 width of at least about 0.015 inches, and a pitch of at
4 least about 0.09 inches.

1 20. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of

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4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a plurality of substantially
7 serpentine grooves.

1 21. The polishing pad of claim 20, wherein the
2 circular grooves have a first pitch, and the serpentine
3 grooves have a second, different pitch.

1 22. The polishing pad of claim 20, wherein the
2 circular grooves have a first width, and the serpentine
3 grooves have a second, different width.

1 23. The polishing pad of claim 20, wherein the
2 serpentine grooves have a pitch between about one and two
3 times their amplitude.

1 24. The polishing pad of claim 20, wherein the
2 serpentine grooves have a pitch between about one-and-one-
3 half and two times their width.

1 25. The polishing pad of claim 20, wherein the
2 serpentine grooves have a width of about 0.125 inches, a
3 pitch of about 0.2 inches, and an amplitude between about
4 0.2 and 0.4 inches.

1 26. The polishing pad of claim 20, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 27. A polishing pad for polishing a substrate in a

2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a second plurality of
7 substantially circular concentric grooves, a center of the
8 second plurality of concentric grooves being offset from a
9 center of the first plurality of concentric grooves.

1 28. The polishing pad of claim 27, wherein the
2 center of the first plurality of grooves is offset from the
3 center of the second plurality of grooves by a distance
4 approximately equal to a pitch of the second plurality of
5 grooves.

1 29. The polishing pad of claim 27, wherein the
2 first plurality of grooves has a first pitch, and the second
3 plurality of grooves has a second, different pitch.

1 30. The polishing pad of claim 27, wherein the
2 first plurality of grooves has a first width, and the second
3 plurality of grooves has a second, different width.

1 31. The polishing pad of claim 27, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a third plurality of
4 substantially circular concentric grooves with a third width
5 and a third pitch, the third plurality of concentric grooves
6 being concentric with the first plurality of concentric
7 grooves.

1 32. The polishing pad of claim 27, wherein each

2 groove of the first and second pluralities of grooves has a
3 depth of at least about 0.02 inches, a width of at least
4 about 0.015 inches, and a pitch of at least 0.09 inches.

1 33. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a plurality of groove arc
7 segments, the groove arc segments disposed along concentric
8 circular paths such that each groove arc segment does not
9 radially overlap a groove arc segment on an adjacent path.

1 34. The polishing pad of claim 33, wherein the
2 circular grooves have a first pitch, and the circular paths
3 have a second, different pitch.

1 35. The polishing pad of claim 33, wherein the
2 circular grooves have a first width and the groove arc
3 segments have a second, different width.

1 36. The polishing pad of claim 33, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 37. The polishing pad of claim 33, wherein the
2 circular grooves and groove arc segments have a depth of at
3 least about 0.02 inches, a width of at least about 0.015
4 inches, and a pitch of at least 0.09 inches.

1 38. A polishing pad for polishing a substrate in a
2 chemical mechanical polishing apparatus, comprising:
3 a first polishing region having a first plurality of
4 substantially circular concentric grooves; and
5 a second polishing region surrounding the first
6 polishing region and having a spiral groove.

1 39. The polishing pad of claim 38, wherein the
2 circular grooves have a first pitch, and the spiral groove
3 has a second, different pitch.

1 40. The polishing pad of claim 38, wherein the
2 circular grooves have a first width, and the spiral groove
3 has a second, different width.

1 41. The polishing pad of claim 38, further
2 comprising a third polishing region surrounding the second
3 polishing region and having a second plurality of
4 substantially circular concentric grooves.

1 42. The polishing pad of claim 38, wherein the
2 circular grooves and spiral groove have a depth of at least
3 about 0.02 inches, a width of at least about 0.015 inches,
4 and a pitch of at least 0.09 inches.